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Psychometric examination of the Persian version of Osteoarthritis Knee and Hip Quality of Life questionnaire

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Abstract

Aim: Osteoarthritis is a serious and prevalent health problem that creates considerable disability when it involves the knee or hip joints. The aim of the study was to adapt and validate the Osteoarthritis Knee and Hip Quality of Life (OAKHQOL) questionnaire for use in a Persian-speaking population.

Methods: A total of 434 patients were recruited. The forward-backward translation process was used to develop the Persian version. Participants were asked to complete the Short Form 12 Health Survey, EuroQoL, visual analog scale for pain and the OAKHQOL questionnaire. Reliability was assessed using Cronbach's alpha and the test-retest method. The structure of the questionnaire was evaluated by exploratory factor analysis. The OAKHQOL was correlated with related measures to establish construct validity. Convergent and discriminant validity were examined with demographic and clinical variables. Comparisons were performed between patients with different severity grades of osteoarthritis.

Results: The mean age of participants was 61.9 (SD 12.1) and the majority were female (91.2%). Principal component analysis demonstrated a five-factor solution that explained 58.4% of the variance. Cronbach's alpha coefficients ranged between 0.74 and 0.89 for all domains of the questionnaire with the exception of the social activities domain. The kappa for test-retest reliability was 0.85. The OAKHQOL demonstrated good discriminative and convergent validity. Construct validity was established by determining significant relationships between related measures. The results of known-groups validity indicated different scores on most domains ($P < 0.001$) across different levels of disease severity.

Conclusion: The questionnaire may be used as a valid and reliable measure for assessing quality of life among Iranian patients with lower limb osteoarthritis.

Key words: osteoarthritis, quality of life, reliability, validity.

INTRODUCTION

Osteoarthritis (OA) is a chronic degenerative disease that causes much disability and pain, especially among older adults.[1] The main characteristic of the disease is a gradual loss of cartilage in the joints.[2] The joints most affected by the disease are knees, hips and hands.[3,4] OA is a worldwide health problem that involves about 8–15% of the general population.[5] Studies show that more than 27 million people suffer from OA in the United States and the annual incidence of disease in the United Kingdom is about 3.1%.[6,7] Nearly 16% of people in China have different stages of knee OA.[8] Reports of OA prevalence range from 8 to 48% among develop-

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ing countries such as Pakistan, India and Bangladesh.[9] Studies in Iran have found the prevalence of OA to be about 15% in urban areas and slightly higher (19%) in rural areas.[10,11]

The pain and disability of OA can limit the ability to engage in work and perform activities of daily living.[12] Moreover, frequent medical visits and hospitalizations along with high costs related to treatment also have a negative impact on quality of life (QoL).[13] Therefore, the goal of disease management in OA is to control pain and enhance physical function in order to improve QoL among patients.[14] QoL has been recognized as an indicator of the effects of disease and is used to measure and compare the results of different treatments.[15]

The QoL is often measured using generic or disease-specific tools. Specific measures assess the impact of important features of the disease as viewed by patients and health professionals.[16] There are disease-specific tools used to assess QoL in patients with OA. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the Lequesne index and Arthritis Impact Measurement Scale 2 (AIMS2) are examples of such instruments.[17–19] These measures mainly focus on function and pain, but other domains of QoL are not assessed.[5] The Osteoarthritis Knee and Hip Quality Of Life (OAKHQOL) is the first questionnaire aimed at measuring different aspects of the QoL in patients who are at various stages of disease severity.[16,20] The questionnaire is based on the WHO definition of QoL and on the idea that using different approaches to assessment may lead to more rich and valid results.[20,21]

Numerous international studies have examined the QoL among OA patients, so their results can be compared globally using valid and reliable instruments.[4] Administering the OAKHQOL questionnaire to various populations with different socio-demographic backgrounds may help to determine the qualities of the instrument and its usefulness in different areas of the world.[12] Cross-cultural validation of the questionnaires in an Islamic country then, should have wide applicability. The aim of the present study is to translate the OAKHQOL into Persian, adapt it for use among Iranian patients with knee or hip OA, and assess the psychometric properties of the instrument.

METHODS

Design and sample

Participants were recruited during a 3-month period from February to April 2013. Patients at three general hospitals located in Tehran city were approached, and these hospitals were chosen based on convenience. Inclusion criteria were diagnosis of knee or hip OA based on American College of Rheumatology criteria,[22,23] Persian speaking, free from other disability and 18 years of age or over. Patients with a history of total hip or knee replacement surgery were excluded. The sample size was determined to meet the minimum needed to perform the psychometric calculations necessary for this study.[24] All participants were interviewed by researchers trained in administration of questionnaires (many participants were illiterate), and signed an informed consent document before data collection. The study was approved by the institutional review board of Baqiyatallah University of Medical Sciences.

Measures

Osteoarthritis Knee and Hip Quality Of Life

The OAKHQOL is a disease-specific questionnaire originally developed by Rat *et al.* to assess the QoL among patients with knee or hip OA. This 43-item measure consists of five dimensions: physical activity (16 items), mental health (13 items), pain (four items), social support (four items) and social functioning or social activities (three items). The three remaining items assess sexual activity, professional life and relationship to spouse. Each item is rated on a 0–10 visual analog scale (VAS). There is no total score for this questionnaire, and only dimension scores are usually reported. The mean score of each dimension is calculated as a standardized score from 0 (worst QoL) to 100 (best QoL). If half of the scores on a dimension are missing, that dimension is omitted.[5] Psychometric properties of the OAKHQOL have been documented in previous studies.[12,25]

Short Form-12 Health Survey

The Short Form-12 Health Survey (SF-12) is a brief version of the SF-36 Health Survey, the most widely used measure of health-related QoL. The SF-12 includes 12 items divided into eight subscales: physical functioning, role limitations (physical and emotional), bodily pain, general health, vitality, social functioning and mental health. The response categories range from 2 to 6 per item. Scores for each subscale are transformed to create a scale from 0 (low) to 100 (high). The SF-12 has two summary components, a Physical Component Summary (PCS) and Mental Component Summary (MCS). The scores of PCS and MCS range from 0 to 100 (mean 50 and standard deviation 10). Higher scores on each component indicate better functioning

on that component.[26] The SF-12 has been validated in the Persian language.[27]

EuroQoL

The EuroQoL (EQ-5D) assesses QoL in five dimensions: personal care, mobility, pain or discomfort, daily activity, and anxiety or depression. This is a widely used measure suitable for use among medical patients and the elderly. The responses in each dimension have three levels (no problems, some problems, severe problems). Using a set of general population preference weights, scores may be converted into a single summarized index (i.e., EQ-5D-3L).[28] The UK Time Trade-Off (TTO) value set of preference weights can be applied to other population when the specific weights of that population do not exist.[29] The EQ-5D also has a supplemental component that involves a VAS on overall health status, with responses ranging from 0 (lowest) to 100 (highest). The questionnaire has been previously used in Iranian patients.[30]

VAS-pain

The VAS-pain is a one-dimensional tool for assessing the intensity of pain. It has been used in a wide variety of populations, especially in patients with musculoskeletal or rheumatic diseases. The scale consists of a horizontal graduated line from 0 to 100 that is anchored by two extreme descriptors (no pain and worst imaginable pain). Participants are asked to indicate their current intensity of pain on the line.[31]

Demographic and clinical variables

Demographic characteristics assessed were age, marriage status, education level, work status, residency and number of children. In addition, clinical parameters such as height, weight, duration of disease, joint with OA (knee or hip), and severity of OA based on criteria of Kellgren–Lawrence (KL) scale were assessed. The KL scale is a radiological measure of OA severity that is reported by a rheumatologist.[32] This has been identified by the WHO as a standard scale for cross-sectional studies.[2]

Adaptation of the OAKHQOL

First, permission for translation of the English version of the questionnaire (V.2.4) into Persian was obtained from the questionnaire's author. We used a standard forward-backward translation method to develop the Persian version.[33] First, two bilingual translators (specialists in rheumatology and health education) translated the scale from English into Persian. Then, the Persian translations from each translator were compared and assessed in terms of fluency, difficulty level and similarity by a team consisting of the translators and members of the research team to achieve consensus and arrive at a common version. Next, two independent professional translators who were bilingual, back-translated the scale from Persian into English. These two translations were then compared to the original English version and revisions made in the Persian version based on consensus of the translators and research team to arrive at a semi-final Persian version. This version of the scale was then distributed to 15 patients with diagnosis of knee or hip OA and debriefing was performed to determine how well the items were understood and their acceptability. Minor revisions were then made to arrive at the final Persian version.

Validity and reliability, and data analysis

We used exploratory factor analysis with varimax rotation to evaluate construct validity and factor structure of the OAKHQOL. The Kaiser–Meyer–Olkin (KMO) index was used to assess the adequacy of sampling. KMO values of more than 0.70 are appropriate. The multi-collinearity of data using Bartlett's test of sphericity was evaluated. When this test is significant, the data is suitable for factor analysis. Dimension extraction was performed applying the Kaiser–Guttman rule and all eigenvalues > 1 were extracted. In order to increase the validity of the principal component analysis, the independent items on the scale (12, 22 and 23) as well as the item related to profession (many patients were not employed) were not considered. Discriminant and convergent validity of the questionnaire was examined by categorizing demographic and clinical variables and assessing the differences between categories. The differences were examined using Student's *t*-test or one-way analysis of variance (ANOVA). Also, Spearman correlation coefficients were calculated to identify associations between dimensions of the OAKHKOL and similar measures of other constructs in order to establish the construct validity of the questionnaire. The known groups validity based on severity grade of the disease in the KL scale was also examined. We hypothesized that patients with higher OA severity would obtain lower scores in the OAKHQOL dimensions, such as physical activity and freedom from pain.

The internal consistency of each domain and the questionnaire overall was evaluated using Cronbach's alpha coefficients. Coefficients > 0.7 are considered acceptable. Reproducibility of the questionnaire was

examined by test-retest reliability. A pilot sample consisting of 19 patients with lower-limb OA was selected, and these individuals completed the OAKHQOL twice within a 2-week interval. They were not included in the main sample.

Floor and ceiling effects were determined for all items as well as each domain. Assessing the frequency distributions of the items or domains may be used to detect floor or ceiling effects. When more than 15% of the participants have the highest or lowest possible scores, floor and ceiling effects may exist.

Descriptive analyses reported the mean and standard deviation of continuous variables or numbers and percentages for categorical variables. A 95% confidence interval was used to assess differences between variables. All statistical analyses were carried out using SPSS software for Windows Version 20 (SPSS Inc., Chicago, IL, USA).

RESULTS

The final sample consisted of 434 patients. The majority of participants were female (91.2%). Mean age was 61.9 (SD 12.1) and 61.2% were married. Most of the patients were unemployed (90.6%) and more than 40% were illiterate. Most participants (88.7%) lived in an urban area. Overweight and obesity (body mass index [BMI] > 25) were present in 77.7%. With regard to location of OA, 374 (86.2%) participants had knee OA and the remainder (13.8%) had hip OA. The mean length of having OA among participants was 8.4 years (SD 6.6). The majority of patients (58.5%) had grade IV osteoarthritis on KL severity scale. Socio-demographic and clinical characteristics are presented in Table 1.

Table 1 Demographic and clinical characteristics of the sample (n = 434)

Variables	N (%)/mean ± SD
Age, mean, SD	61.9 ± 12.1
Sex	
Male	38 (8.8)
Female	396 (91.2)
Marital status	
Single	8 (1.8)
Married	296 (68.2)
Widowed	126 (29.0)
Divorced	4 (0.9)
Occupation	
Employed	41 (9.4)
Unemployed	393 (90.6)
Education	
Illiterate	175 (40.3)
Primary	151 (34.8)
Secondary	85 (19.6)
University	23 (5.3)
Location	
City	385 (88.7)
Village	49 (11.3)
Number of children	4.6 ± 2.3
Height (cm)	160.3 ± 8.6
Weight (kg)	74.0 ± 13.0
Body mass index (kg/m^2)	
≤ 25	97 (22.3)
25–30	176 (40.6)
≥ 30	161 (37.1)
Osteoarthritis joint	
Knee	374 (86.2)
Hip	60 (13.8)
Duration of the disease (years)	8.4 ± 6.6
Severity: Kellgren–Lawrence	
I	12 (2.8)
II	140 (32.3)
III	28 (6.4)
IV	254 (58.5)

Table 2 presents the results of principal component and factor structure analysis. The KMO value was 0.83, indicating adequacy of the sample for factor analysis. Based on Bartlett's test there was no multi-collinearity (P < 0.001). As is shown, a five-factor solution was found for the OAKHQOL. Most of the items loaded on the original domains as expected. However, two items from pain domain (Q26 and Q27) loaded on the physical activity dimension. Also, a social functioning item (Q30) loaded on the mental health domain. These five factors explained 58.4% of variance. The first two factors (physical activity and mental health) explained 40% of the variance.

Measures of convergent, discriminant and known groups validity are presented in Table 3. As we expected, except the pain dimension (P = 0.065), there were significant differences between age groups on all domains of the questionnaire (P < 0.05). Males and females differed in pain and social support scores (P < 0.001). The score of pain among obese participants was considerably lower than those who were not obese (P = 0.006). The patients with knee OA compared to hip OA reported more difficulties in their physical activity (P < 0.001). The findings related to known-groups validity also demonstrated significant differences in the domains of physical activity, pain and social support (P < 0.001), such that the patients with higher grades of the KL scale reported more problems in these domains.

Table 2 Factor loadings of OAKHQOL using principal component analysis with varimax rotation

Item[†]	Original class	Component 1 (physical activity)	Component 2 (mental health)	Component 3 (pain)	Component 4 (social support)	Component 5 (social function)
Q1	PA	**0.624**	0.277	0.322	−0.183	0.256
Q2	PA	**0.581**	0.411	0.173	−0.181	0.333
Q3	PA	**0.734**	0.324	0.063	−0.141	−0.245
Q4	PA	**0.905**	0.126	−0.019	0.098	0.018
Q5	PA	**0.887**	0.154	−0.037	0.005	0.017
Q6	PA	**0.459**	0.214	0.024	0.072	0.044
Q7	PA	**0.432**	0.033	0.058	0.084	0.054
Q8	PA	**0.428**	0.019	0.138	0.125	−0.080
Q9	PA	**0.774**	0.166	0.062	0.087	0.269
Q10	PA	**0.721**	0.430	0.117	−0.074	0.049
Q13	PA	**0.685**	0.206	0.086	0.041	0.068
Q14	PA	**0.468**	0.338	0.280	0.093	0.161
Q15	MH	0.297	**0.702**	0.218	0.070	0.056
Q16	MH	0.238	**0.678**	−0.035	0.167	0.129
Q17	MH	0.231	**0.740**	−0.082	0.001	0.124
Q18	MH	0.189	**0.489**	−0.065	0.034	0.032
Q19	MH	0.070	**0.882**	0.003	0.023	−0.014
Q20	MH	0.002	**0.776**	0.034	0.064	0.077
Q21	MH	0.348	**0.501**	0.337	0.014	0.190
Q24	PA	**0.741**	0.001	0.235	0.217	0.238
Q25	PA	**0.468**	0.283	0.210	−0.180	0.054
Q26	P	**0.553**	0.187	0.452	0.183	0.045
Q27	P	**0.632**	0.124	0.421	0.242	0.102
Q28	PA	**0.589**	0.207	0.292	0.073	0.093
Q29	MH	0.062	**0.633**	0.166	0.108	−0.098
Q30	SF	0.057	**0.463**	−0.169	0.122	0.421
Q31	SF	0.164	0.250	0.204	0.040	**0.595**
Q32	SF	0.029	−0.019	0.113	−0.136	**0.695**
Q33	P	0.219	0.200	**0.856**	0.075	0.057
Q34	P	0.168	0.202	**0.836**	0.146	0.064
Q35	MH	0.236	**0.680**	0.285	0.282	0.078
Q36	MH	0.008	**0.806**	0.230	0.003	0.004
Q37	MH	0.148	**0.685**	0.354	0.236	0.068
Q38	MH	0.202	**0.655**	0.126	0.372	0.037
Q39	SS	−0.353	−0.129	−0.164	**0.751**	−0.002
Q40	SS	−0.241	−0.068	−0.189	**0.793**	−0.075
Q41	MH	0.114	**0.459**	0.152	0.132	0.099
Q42	SS	−0.149	−0.031	−0.150	**0.491**	−0.038
Q43	SS	−0.182	0.026	0.142	**0.664**	−0.077
EV		8.283	7.336	2.952	2.602	1.687
% σ^2		21.2	18.8	7.5	6.6	4.3

Values in bold are loaded items in each component.
[†]Items 11, 12, 22 and 23 have been omitted from the list. EV, eigenvalue; MH, mental health; P, pain; PA, physical activity; SF, social functioning; SS, social support.

Table 4 presents findings related to the construct validity of the OAKHQOL. The correlations between the questionnaire and SF-12 scales revealed significant correlations ($P < 0.01$) especially among similar domains. The EQ-5D scores, except for the VAS and social support domains, were all significantly correlated to subscales of the OAKHQOL. The VAS-pain was also negatively correlated with physical activity and mental health domains and was positively correlated to the remaining dimension of the OAKHQOL ($P < 0.01$).

Table 3 Convergent and discriminant validity of the OAKHQOL

	N	Domains of Pr-OAKHQOL													
		Physical activity			Mental health			Pain			Social support			Social functioning		
		Mean	SD	*P*	Mean	SD	*P*	Mean	SD	*P*	Mean	SD	*P*	Mean	SD	*P*
Age (years)																
< 60	180	37.3	17.4	**0.048**	45.4	16.2	**0.029**	27.3	22.5	0.065	80.6	18.3	**0.000**	69.3	16.2	**0.002**
60–70	147	33.6	13.4		43.7	15.7		21.8	20.3		88.0	10.8		66.5	15.9	
> 70	107	34.5	11.5		48.9	13.5		25.1	18.3		87.1	10.3		62.4	16.0	
Sex																
Male	38	37.2	15.9	0.457	47.0	21.8	0.693	38.2	20.7	**0.000**	72.5	16.5	**0.000**	63.6	21.7	0.237
Female	396	35.3	14.8		45.6	14.8		23.6	20.5		85.9	13.9		66.9	15.6	
Residence																
City	385	35.7	14.8	0.358	55.3	15.7	0.113	24.6	21.0	0.479	84.7	14.7	0.756	67.0	16.0	0.121
Village	49	33.6	15.5		49.0	13.7		26.9	20.1		85.4	14.6		63.2	17.6	
OA duration																
≤ 8 years	283	37.8	16.7	**0.000**	47.5	15.2	**0.001**	26.7	21.6	**0.016**	84.4	15.1	0.467	68.7	15.2	**0.000**
> 8 years	151	31.0	13.2		42.2	15.5		21.6	19.0		85.4	13.9		62.7	17.3	
BMI																
≤ 25	97	35.4	13.0	0.076	46.7	15.5	0.162	27.6	20.4	**0.006**	84.7	13.8	0.762	66.4	18.9	0.672
25–30	176	37.2	16.4		46.8	14.7		27.2	22.2		84.2	13.7		67.4	14.4	
≥ 30	161	33.5	14.0		43.8	16.2		20.8	19.1		85.4	16.2		65.9	16.4	
Joint																
Knee	374	36.9	15.0	**0.000**	45.8	16.0	0.661	25.5	21.2	0.128	84.4	14.7	0.211	66.9	16.8	0.426
Hip	60	26.3	10.2		45.0	11.8		21.1	18.7		87.0	14.6		65.1	12.2	
Severity (K–L)																
I	12	44.2	13.5	**0.000**	38.5	19.1	0.092	23.7	17.4	**0.000**	57.2	27.6	**0.000**	74.7	10.7	0.078
II	140	43.3	15.7		47.6	15.6		37.7	21.1		79.9	15.2		68.1	18.3	
III	28	38.2	17.9		48.2	17.7		27.9	18.0		83.4	12.8		62.0	19.7	
IV	254	30.4	11.6		44.7	14.9		17.6	17.6		88.9	11.2		65.9	14.6	

K–L, Kellgren–Lawrence scale; OA, osteoarthritis; OAKHQOL, Osteoarthritis Knee and Hip Quality of Life Questionnaire; SD, standard deviation. Significant P-values are in bold.

The OAKHQOL also showed acceptable internal consistency with Cronbach's alphas higher than 0.74 in all domains except social activities, where the alpha was 0.54. The alpha for the OAHQOL overall was 0.90 (Table 4). Two-week test-retest reliability in the pilot sample of 19 patients produced a kappa value of 0.85. Assessing the floor and ceiling effects of individual items indicated that floor effect was observable in items 6–8, 18–20, 25, 29, 36 and 41. Items 1–5, 9, 24–28, 32–34, 38–40, 42 and 43 had varying degrees of ceiling effect. However, these effects in the domains of the questionnaire (except for a ceiling effect in social support) were not considerable. The descriptive properties of each domain are presented in Table 5.

Regarding the independent items, only 9.4% of the patients reported levels of working problems (others were unemployed) (No. 12) with a mean of 87.5 (SD 18.51); for no. 22, 31.7% did not have a spouse and the mean of those who did was 71.9 (SD 24.6); and for no. 23, almost 25% of participants reported no sexual relations in the past month and others reported a mean score of 65.1 (SD 21.5).

DISCUSSION

We found the Persian version of the OAKHQOL to have acceptable validity, reliability and factor structure. The original five dimensions of the questionnaire (physical activity, mental health, pain, social support and social activities) were confirmed. Thus, the Persian version of the OAKHQOL can be considered a disease-specific tool capable of measuring QoL in patients with knee or hip OA.

We assessed several indicators of validity in order to compare our results to previous research on the questionnaire. The construct validity in prior studies mostly focused on the relationships between the scores of the OAKHQOL to other QoL tools such as the WOMAC,

Table 4 Correlation matrix between scales of the OAKHQOL, SF-12, EQ-5D and Pain (VAS)

	OAKHQOL scales				
	Physical activity	Mental health	Pain	Social support	Social activities
SF-12					
Physical function	0.690*	0.446*	0.613*	−0.318*	0.367*
Role (physical)	0.639*	0.357*	0.575*	−0.228*	0.341*
Role (emotional)	0.501*	0.388*	0.525*	−0.267*	0.284*
Bodily pain	0.673*	0.420*	0.620*	−0.301*	0.410*
General health	0.347*	0.457*	0.351*	0.023	0.224*
Vitality	0.481*	0.334*	0.503*	−0.257*	0.371*
Social function	0.637*	0.355*	0.556*	−0.277*	0.343*
Mental health	0.321*	0.580*	0.413*	−0.062	0.275*
MCS	0.464*	0.559*	0.545*	−0.161*	0.320*
PCS	0.736*	0.404*	0.637*	−0.280*	0.415*
EQ-5D					
EQ-5D-3L	0.496*	0.466*	0.441*	−0.168*	0.289*
EQ-5D-VAS	0.185*	0.183*	0.202*	0.049	0.141*
Pain (VAS)	−0.718*	−0.602*	−0.693*	0.339*	−0.288*

*$P < 0.01$. OAKHQOL, Osteoarthritis Knee and Hip Quality of Life Questionnaire; SF-12, Short Form 12 Health Survey; EQ-5D, EruoQol Questionnaire; VAS, visual analog scale; MCS. Mental Component Summary; PCS, Physical Component Summary.

Table 5 Descriptive analysis, floor, ceiling effect and reliability of the OAKHQOL scales

Scale	Number of items	Mean	SD	Floor effect (%)	Ceiling effect (%)	Cronbach's α
Physical activity	16	35.4	14.9	0.9	0.9	0.887
Mental health	13	45.7	15.5	0.7	0.5	0.850
Pain	4	24.9	20.9	13.8	0.5	0.856
Social support	4	84.7	14.7	0.7	17.1	0.743
Social activities	3	66.6	16.2	0.7	3.7	0.543
Overall	40	51.5	9.6	0.5	0.5	0.895

OAKHQOL, Osteoarthritis Knee and Hip Quality of Life Questionnaire.

SF-36 and EQ-5D.[12,25] We also evaluated the factor structure of the OAKHQOL. Dimensionality of the scale has only been investigated by the original authors of the questionnaire.[5,20] They reached a four-factor solution which omitted the social activities domain. As noted by other investigators, when the number of items in a dimension is limited, the chance of replicating loadings on a dimension is reduced.[34,35] However, our attempt to eliminate missing or irrelevant responses may have improved the results of our factor analysis.

Nevertheless, some items did not load on the original domains. For example, two items related to domain of pain (Q26 and Q27) loaded on the physical activity domain. This finding was also reported on the initial research involved in developing the questionnaire.[20] Although Rat *et al.* believed that correlation between pain and physical function based on results of previous studies[36,37] may be ignored, we believe that this correlation is notable and may be the main reason for loadings of items related to the frequency and intensity of pain on the physical activity domain. As shown in the Table 3, there is considerable correlation between the physical function's domain of the SF-12 and the pain domain of the OAKHQOL, which confirms this. In other words, pain may be the most important cause of physical disability among such patients.

In addition, item 30 loaded on the mental health component of the questionnaire. This item was originally recognized as belonging to the social activities dimension.[5] This item states: 'I am able to plan projects for the long term'. A person who has the capacity to plan projects in the future may be more involved into social affairs, indicating ability for thinking and foresight which is often related to mental health. However, the loading of this item on the social activities domain is also considerable. Therefore, there is a need for further assessment regarding on what domain this item really belongs.

Our results on the convergent validity of the questionnaire are comparable to other studies.[5,12,20,25] Gonzalez Saenz de Tejada *et al.* used the SF-36 to evaluate the convergent and construct validity of the OAKHQOL. Since the SF-12 is a shortened version of the SF-36, many of the correlations reported by these investigators were similar to those in our study, except for the social support domain that was different.[12] The likely explanation for this difference may be the role of socio-cultural components in social support that may vary among people from different communities.

Several demographic and clinical characteristics, such as age, sex, duration of disease, BMI and severity of OA were related to domains of the questionnaire. The relationship between age and QoL here and in other studies[5,25] indicates that increasing age has a negative impact on QoL among OA patients. Moreover, the differences between men and women on the domains of pain and social support[5,20] are interesting. This may indicate the need for different approaches in men and women for dealing with problems in these domains of the QoL. The duration of disease also affects QoL in many domains except for social support. The reason may be that when QoL is lower than normal, patients usually request more social support to cope with the disease.[38] With increasing BMI score, only the pain domain indicated a significant difference, which may be due to the effects of being overweight on the exacerbation of pain. This has been reported in numerous previous studies.[5,9,13,20]

The findings from our known-groups validity analysis corroborate the construct validity of the scale. Using this method we were able to show differences between groups based on different levels of OA severity. In a previous study, the Lequesne Index was used to classifying patients in terms of severity.[12] However, this is a patient-reported tool that may suffer from respondent biases (reporting and information). We avoided these biases by using a standard clinical index (KL) that has been widely accepted among specialists of rheumatology as a standard measure of OA progression.[2]

The Cronbach's alpha coefficients also demonstrated good internal consistency for the questionnaire. However, the alpha for the social support domain was lower than the acceptable value of 0.70. This may be related to insufficient numbers of items along with the ambiguity of item 30 regarding the planning of projects. Perhaps rewording this item as 'defining social projects in working with others' would more clearly place it in the social activities domain. A low internal consistency for this domain has been reported by other researchers.[12,25]

Our study had both strengths and limitations. We used a personal interview using a standard format for data collection. This helped to avoid missing data and may have led to increased external validity for the questionnaire. We also ensured that our sample size was sufficient to test the psychometrics of the questionnaire. However, several limitations must also be considered when interpreting the findings. First, we did not have access to a similar disease-specific measure of QoL in Persian to assess concurrent validity. Using a previously validated scale such as the WOMAC would have helped to establish the criterion validity of the scale. Second, due to limited resources and time to perform the study, we could not evaluate the responsiveness of the scale to change. However, the OAKHQOL has shown adequate responsiveness to change in a previous study.[12] Finally, our sample was selected from patients who were most accessible to us, which may limit the generalizability of the results. Further research using a probability sampling method is recommended.

CONCLUSION

Our findings indicate that the psychometric properties of the Persian version of the OAKHQOL are acceptable. Therefore, this questionnaire is an appropriate instrument for assessing health-related QoL in studies among Iranian and other Persian-speaking patients with OA. The OAKHQOL may be a good alternative to generic scales such as SF-36 or SF-12 in studies examining the effect of QoL on medical outcomes in patients with knee or hip OA. Further research is also needed to determine whether the questionnaire can detect improvements in QoL in response to medical or surgical procedures over time. The questionnaire also needs validation in other cultures and in other population groups with OA.

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